

THE SANTA MONICA WORKSHOP

01

In May 2015, sustainability experts from across the nation convened in Santa Monica, California to explore statutory, technological, and engineering barriers to the widespread implementation of water recycling and reuse systems in commercial and residential buildings.

This guide highlights the key findings and critical next steps that emerged from this robust discussion, identifying a way forward for the practical implementation of Net-Zero Water strategies for buildings in the City of Santa Monica and Los Angeles County.



- THE SANTA MONICA WORKSHOP -
Solution Finding for Net-Zero Water
Annenberg Community Beach House
5 / 21 / 2015



Scarce resources underscore the need to focus on net-zero water strategies Ana Filipa Neves / Upsplash

In Southern California our water comes from so far away – the Eastern Sierras, the Sacramento-San Joaquin Delta, the Rockies – that the fallacy of using water just once is a self-evident civic embarrassment. Moving the pristine alpine water thousands of miles to then use it to flush a toilet is clearly symptomatic of an urban society that is disconnected from nature and inherently unsustainable. Combining the cyclical droughts of our Mediterranean climate with the uncertainty of climate necessitates a regional perspective and a systemic approach to future water management.

Reducing water use is a core element in the green building palette and has been from the outset. LEED for Homes, a rating system we used to certify over 2,000 units of low-income housing over the past seven years, awards points for using recycled water, captured greywater, or rainwater. But even the LEED Platinum projects have not earned these points. This naturally begs the question of - why not? Is it due to a lack of ambition, an unwillingness to try new technologies, or solve hard problems? No, we do this on a regular basis at Global Green, in our efforts to demonstrate the possible and make the possible commonplace. So where is ambition misaligned with practice? This is what we hoped to discover through the Net-Zero Water Workshop.

Most critically, we wanted to clearly identify the barriers that keep green designers from moving into the next level of practice in creating an integrated water cycle. Fortunately, we weren't starting from zero. Our work in green affordable housing included several projects that pursued "laundry to landscape" systems. While an obvious first step toward getting multiple uses out of the same volume of water, LEED for Homes requires that a project offset at least 10 percent of the total project indoor and outdoor water demand to start earning points. To do this means capturing greywater from showers and bathroom sinks for toilet flushing, which makes a great deal of sense when you



Lake Oroville at 30% capacity / Justin Sullivan / Getty Images

see how well the volume of water from showers matches the amount needed for daily toilet flushing. This alignment between greywater supply and potential uses in resident developments first came to light in the Green Urbanism Studio class I co-teach at UCLA that is based on spirit and standards of the Living Communities Challenge.

But being an obvious solution in a spreadsheet doesn't mean that the strategy is easy or possible to implement in the existing regulatory and practice context. On site capture and use of rainwater, greywater, or urban runoff requires a significant realignment of priorities in both design and operations. And as we learned over the course of the one-day Workshop, not all of these approaches are clearly legal, or even just clearly not illegal. A nebulous code landscape quickly leads to inaction, as concerns about health risks lead to concerns about liability, and then to a decision that it is better for someone else to be the trailblazer.

Our current situation regarding water use is not sustainable from a resource, design, or regulatory standpoint. While a growing number of designers, policymakers, and advocates recognize the imperative to use water efficiently and use potable water only when needed for potable uses, getting to this point requires a collective effort to untangle a particularly tricky Gordian knot.

How to best do this, in order to create a clear and legal pathway for projects pursuing greywater systems or even net positive water strategies, is where we focused our collective energy over the course of the Summit. Ultimately, we recognized the need for a combination of project-based action, county level collaboration on innovative practice, and state-level reform to the plumbing and health codes. Fresh, potable, storm, or grey, it's all water that needs to be treated like the precious resource that it is. For that to happen we must find a new balance between protecting public health, adapting to a changing climate, and fostering a healthy urban ecosystem.



At the time the idea for a think-tank style, solution finding workshop in Santa Monica occurred, the California drought was reaching unprecedented severity. Another winter just passed with no contribution to the Sierra snowpack, where most of California gets its potable water. Debates inevitably gravitated towards whose fault it was, how much money we could throw at it and who should lead the response. Solutions spanned from, “Wait for the rain. It will come. It always has.” to “It’s time to build massive desalination plants up and down the coast. All the water we need is right there.” As is usually the case, the right course of action is somewhere in the middle.

In Santa Monica, sustainability and water efficiency are embedded in the culture. The world’s first Sustainable City Plan, adopted in 1994, is founded on eleven Guiding Principles that provide the basis from which effective decisions related to climate, energy and water can be made. In 2013, Santa Monica City Council approved a 15 x 15 Climate Action Plan, which established 15 short-term, action-oriented measures that will reduce community greenhouse gas emissions 15% below 1990 levels by 2015. The following year, City Council adopted the landmark Sustainable Water Master Plan, which outlines steps necessary to achieve water self-sufficiency by eliminating reliance on imported water by 2020. Combined, these plans shape the decision making process to meet bold, long-range sustainability goals the City has committed to.

As sustainable building advisor for Santa Monica, it was obvious the first annual Santa Monica Solution Finding Workshop should be focused on net-zero water buildings. Working in the Office of Sustainability and the Environment for the City of Santa Monica provides a unique platform to push innovation. To us, the issues of water management in buildings are fairly simple. State laws don’t allow us to value the scarcity of water appropriately. Subsequently, the community is not motivated to conserve for economic reasons.

Value is the fundamental problem, but regulatory barriers are a close second. Water efficiency ideas at the leading edge of green building and organizations that value water are restricted by the building, plumbing, water and health codes. The challenge is not technical but economic, political, and in the case of water, cultural; a common phenomenon in the green building movement. This became evident to us as we embarked on the feasibility of designing a 50,000 square foot commercial office building to achieve full Living Building Challenge certification.

The City has been committed to water efficiency for decades, however we had not gone through the exercise of what net-zero water at the building level, which Living Building Challenge requires, looks like. In one of our first charrettes with the design team, we evaluated the water capture, treatment and reuse options available to us. Although each had been demonstrated in practice somewhere globally, most were either explicitly illegal or at least silent from a code perspective. Our consultant then introduced a powerful, infographic flowchart, which clearly outlined the Roadmap to Water Independent buildings in Oregon. From the clouds to the building surface, the Roadmap identified various agencies, appeals and permits necessary to keep water molecules on-site so the building becomes independent of municipal water supply and disposal.

It was clear a roadmap was needed for Santa Monica, Southern California and eventually California. We couldn't have an informed discussion with our design team without better clarity and transparency in the regulatory process. It was unimaginable to consider how we as the local government, let alone private sector design teams, could navigate this complex world. There are qualified people and committed working groups forming across the western United States to better prepare us for a water scarce future. Although we fully support these initiatives, this was not the problem we set

out to solve. We simply wanted to know what our current reality is. Proponents of decentralized water reuse often vilify health agencies, plumbing inspectors and state water agencies. In our experience, we have witnessed how much each of these stakeholders wants to be part of the solution.

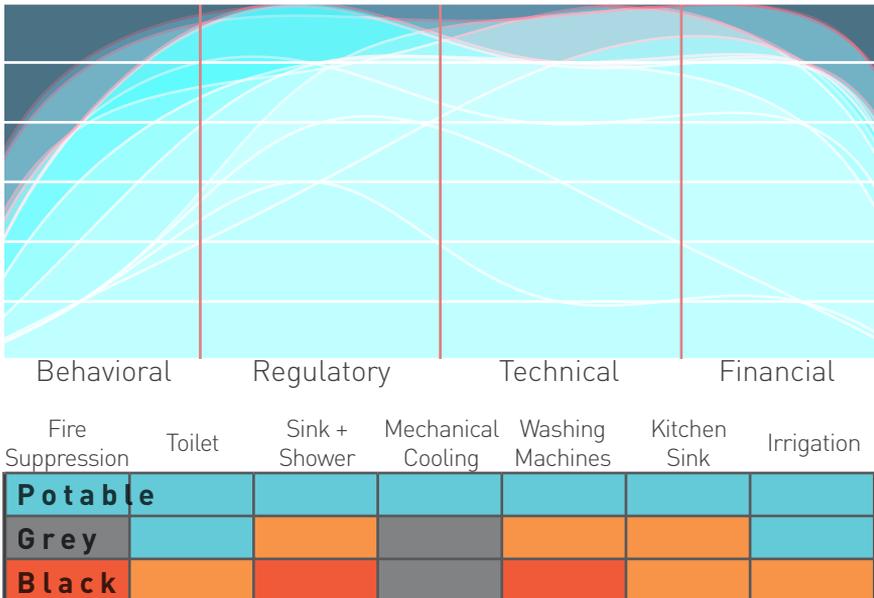
With a plan to be water self-sufficient city-wide by 2020 and a new understanding of how achievable water independent buildings can be, we believe net-zero water is part of the City's future. Treating development sites like watersheds unlocks new sources of water and reduces stormwater pollution in the ocean. New water strengthens our resiliency by reducing pressure on groundwater aquifers that will be impacted by climate change and actions from upstream jurisdictions. It contributes to our ultimate vision of carbon neutrality by reducing embedded energy from water conveyance. Net-zero water buildings are important to Santa Monica's sustainable city plan and we believe the tools to build, permit and operate them safely and efficiently are available now.

So we held the first annual Santa Monica Workshop: Solution Finding for Net-Zero Water.

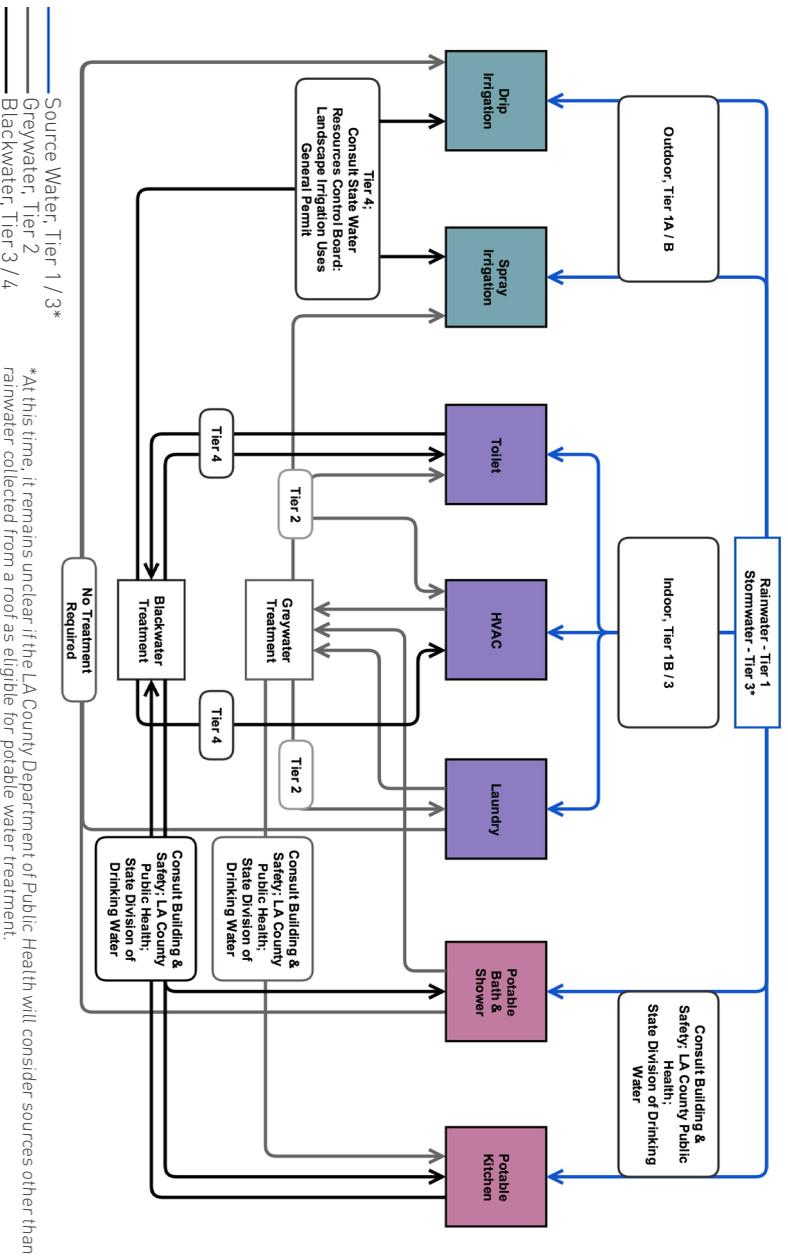
Barriers, Suitability, and Roadmap

The pathway toward the commonplace inclusion of greywater and blackwater systems in residential and commercial buildings is blocked not by technical challenges, though they do exist, but by an unclear and at times contradictory regulatory landscape. The graph below charts the relative difficulty of barriers to grey and blackwater implementation, and illustrates the concentration of challenges is most pronounced in the regulatory realm. The accompanying matrix identifies suitable uses for greywater and blackwater.

The road map on the facing page is a diagrammatic summary of what we learned during the workshop and serves as guide to determining which agencies to work with and what treatment standards are required for specific grey and blackwater applications. This document references the 2015 LA County Department of Public Health Guidelines for Alternate Water Sources.

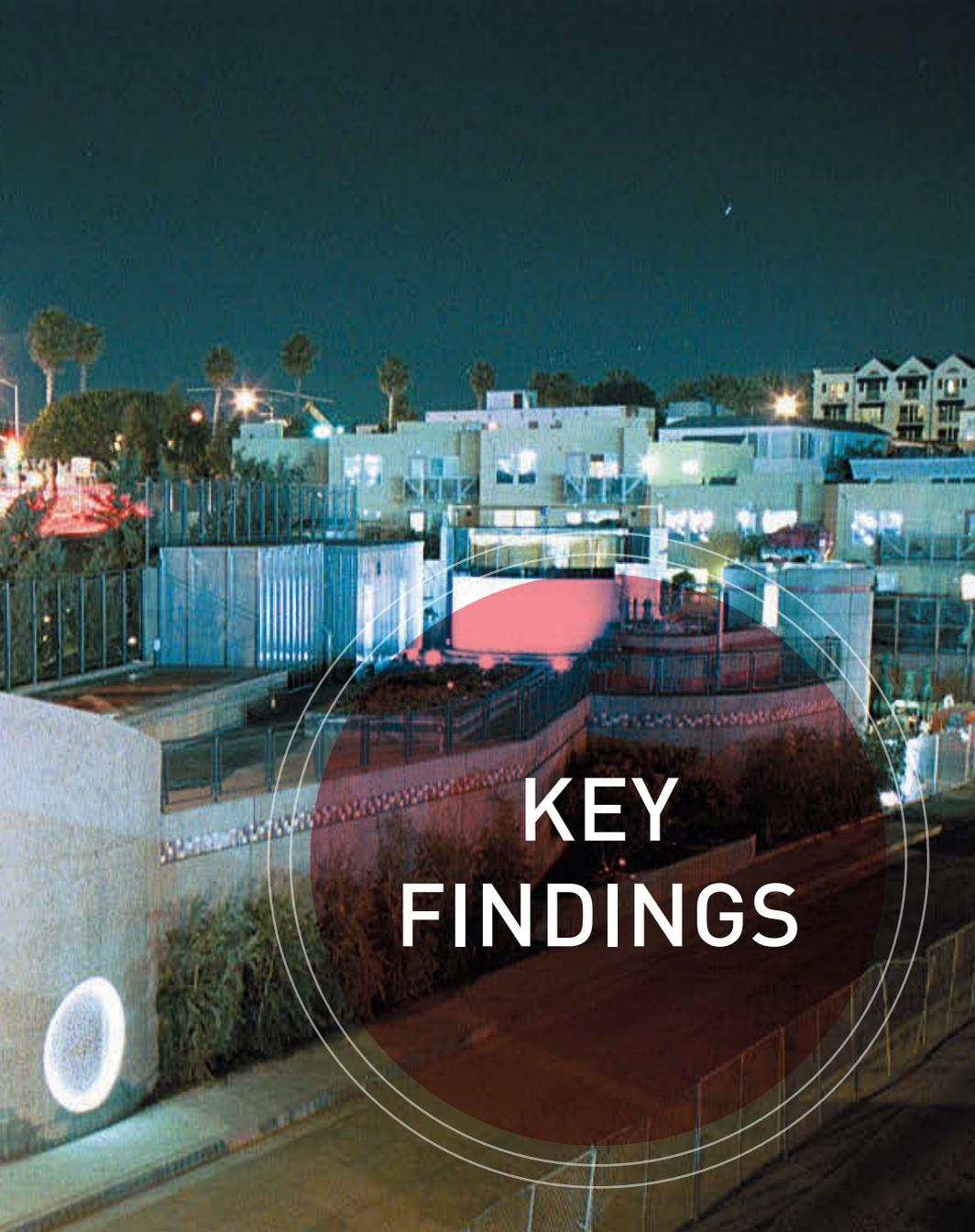


Roadmap to Net-Zero Water in Santa Monica





The Santa Monica Urban Runoff Recycling Facility cleans runoff prior to reuse



**KEY
FINDINGS**

Key Outcomes and Recommendations

A robust exchange of ideas, challenges, and solutions was shared during the Solutions Finding workshop. Through presentations by leading practitioners, working sessions, facilitated discussions, and a panel of code officials, a number of themes emerged. Taken as a whole, the 10 key outcomes presented on the right demonstrate that the roadblocks to the practical implementation of Net-Zero Water currently lie more in political and cultural realms than in engineering or architecture.

-
1. The California Plumbing Code must recognize and provide a clear definition for blackwater.
 2. Terminology must be simplified and made innocuous. “New Water” is a place to start.
 3. Cities should perform no-cost Title 22 testing to encourage inclusion of these systems.
 4. Treated greywater should be able to be stored with other sources (rain, nuisance, stormwater).
 5. A regional framework is needed to simplify water quality monitoring and reporting.
 6. Design-build packaged treatment systems should be eligible for NSF-350 certification.
 7. Pressurized, automated valve systems should qualify for cross-connection protection as an alternate to air gaps.
 8. A universal index similar to Energy Use Intensity (EUI) for energy is needed for water in order to standardize portfolio management.
 9. To reduce costs for dual plumbing that allows for greywater, plastic piping should be allowed. Plumbing unions should be engaged to ensure quality of workmanship.
 10. Nuisance water such as groundwater removal from subterranean parking structures presents an enormous opportunity for capture and reuse.



Santa Monica's Pico Branch Library utilizes greywater systems and drought tolerant landscaping



NEXT STEPS



Next Step 1

Refine and Update State, County, and Local Codes to Address Greywater and Blackwater

All sources of water need to be considered and addressed by code and permitting procedures. This includes potable water, rainwater, stormwater, nuisance water, greywater, and blackwater. The current code landscape is confusing and has several critical gaps between the permitting needs and authority of cities and counties. First the plumbing code needs to be expanded to provide standards for blackwater systems. Second there needs to be better alignment between the plumbing code (Chapter 17) and the Title 22 health code is needed. The plumbing code provides standards for the design and construction of the physical aspects of a greywater system but is silent about compliant operation of the system after certification of occupancy.

County guidelines on alternate water sources for outdoor and indoor use are currently under review by the Los Angeles Department of Public Health, and will establish a regulatory framework in which greywater and blackwater systems can more readily be implemented in commercial and residential projects.

Moving forward, the success of these code reforms will depend on a concerted effort by practitioners and state / county / local officials to advocate for the inclusion of these systems in residential and commercial projects.



Next Step 2

Improve Testing Procedures, System Certification, and Mitigate Practitioner Risk

Concerns regarding health risks are valid, but current practice relies on an abundance of caution and redundant systems that create unnecessary additional costs. The current testing requirements are onerous to the point of infeasibility for modest size buildings. Exactly what needs to be tested and at what frequency should be clarified. Testing requirements should be reevaluated based on the type of water that is being treated and reused, rather than apply the most stringent testing requirements to all systems.

Local building officials need assistance in managing risk to themselves and their jurisdictions. Clear guidance documents on the current design and operating standards need to be provided, so officials are not expected to approve innovative water systems as code exemptions or variances, but rather as code compliant.

Finally, officials need accepted industry standards for equipment. NSF 350 currently applies to greywater systems in single-family homes and non-residential buildings. NSF 350 greywater standards should be expanded to include multi-family residential. NSF 350 should also be augmented to provide standards for blackwater systems for all building types.



Next Step 3

Shift Public Perception and Incentivize Grey and Blackwater Systems

Public perception about reusing water needs to change from being something that is icky to being common sense. This partly has to do with the terms that are used. New water or recycled water are more acceptable terms than greywater and blackwater.

Incentives are needed to encourage designers and developers to pursue grey and blackwater systems. These could be financial mechanisms, technical assistance, code review expediting, or risk mitigation. Additionally, clear codes and right installation standards for residential homeowners should be publicized and encouraged.

To help catalyze this shift in perception, an advocacy group should be established to target how blackwater is addressed in the California Plumbing Code.



“Managed properly, we have more than enough water to meet our needs.”

-Josiah Cain



“We take nature’s purest water, glacial snowmelt, and use it to flush toilets, irrigate grass and wash cars.”

-Joel Cesare





“The best way to permit and streamline grey and blackwater is to put it in the code.”

- Osama Younan

“We are hitting the limits of scale from efficiency.”

- Bill Worthen



Participants

Russell Ackerman

City of Santa Monica

Tara Barauskas

A Community of Friends

Tim Bevins

Global Green USA

Katie Bohren

Biohabitats

Carlos Borja

LA County Public Health

Josiah Cain

Sherwood Design Engineers

Joel Cesare

City of Santa Monica

George Chavez

City of Beverly Hills

Courtney Crosson

Buro Happold

Liz Crosson

LA Waterkeeper

Audrey Davenport

Google

Kate Diamond

HDR Architecture

Michael Folonis

Michael W. Folonis Architects

Krista Frank

Global Green USA

Aline Goganian

Natural Resources Defense Council

Blake Herrschaft

DNV GL Consultants

Tim Kohut

Green Dinosaur

Hank Koning

Koning Eisenberg Architects

Gary Lai

HDR

Lisa Mattheisson

Integral Group

Ryan McAvoy

Gaia Development

Josephine Miller

City of Santa Monica

Stacia Miller

International Living Futures Institute

John Onderdonk

Caltech

Shannon Parry

City of Santa Monica

Shane Peters

City of Santa Monica

Casandra Rauser

UCLA

Andy Reilman

Integral Group

Neal Shapiro

City of Santa Monica

Peter Shellenbarger

Heal the Bay

Brooke Sween-McGloin

City of Santa Monica

Ron Takiguchi

City of Santa Monica

Michelle Tsiebos

LA County Public Health

Tom Watson

City of Santa Monica

Walker Wells

Global Green USA

Maung Winn

Buro Happold

Bill Worthen

Urban Fabrick

Osama Younan

City of Los Angeles

John Zinner

Zinner Consultants



For more information on greywater or blackwater systems in Santa Monica, please contact city Sustainable Building Advisor Joel Cesare at 310.458.8549 or joel.cesare@smgov.net

Printed on 100% post-consumer recycled content paper

Office of Sustainability + the Environment
1717 4th Street, Suite 100 Santa Monica, CA 90401